

SCIENTIFIC NOTES.

ACTION OF THE CUTICLE OF PLANTS.—M. Barthelemy has applied the principle of osmosis in explaining plant respiration. In plants there exists a cuticle which has a chemical composition and a physical constitution somewhat resembling caoutchouc; it is not found at the stomata or the union of leaves. As the exhalation of oxygen is greatest when sunlight falls on the upper surface of leaves, Barthelemy explains this supposing that the respiration takes place on the cuticle of the upper surface, and that the stoma or pores of the under surface perhaps absorb only nitrogen.

Hearing organs of Crustacea.—Sir John Lubbock, in discussing on Crustacea, says: "We do not understand how they see, smell, or hear; nor are entomologists entirely agreed as to the function or the structure of the various organs. An interesting subject offers a wide opening field for study, and I would particularly call the attention of entomologists to a remarkable memoir by Hensen, on the auditory organs of Crustacea in the decapod Crustacea. There are shown that the otolithes in the otoacoustic sacs of shrimps are foreign particles introduced into the organ by the animal itself. He proved this very ingeniously by putting a shrimp in filtered water, with sand, but with crystals of uric acid. Two hours after the animal had moved about, it was found that the sacs contained many of these crystals. M. Hensen has also shown that the hair in the auditory canal is susceptible of being thrown into vibration by a particle of sand, and probably determined by the form and thickness of the hair. It may be experimentally shown that certain sounds throw particular hairs into rapid vibration, while others around them remain perfectly still."

Double Refraction.—Prof. Tyndall, in a recent lecture "On Light," at the Royal Institution of London, very clearly explains the phenomenon of Double Refraction, according to the theory that all luminous effects are the result of undulations of a light-attenuated and subtle fluid which pervades all space, and permeates all ponderable matter. In air, water, and other substances, this ether has the same elasticities in all directions. There is nothing in the molecular grouping of these substances to interfere with the perfect homogeneity of the ether, so that water crystallizes to ice, and is different; here the molecules are held together by their proper forces to arrange themselves in a certain determined manner. Thus, for example, closer together in some directions than in others. This arrangement of the molecules carries along with it the arrangement of the surrounding ether, which causes to possess different degrees of elasticity in different directions. In a plate of ice, we have the elasticity of the ether in question perpendicular to the plane of the ice, and is different from its elasticity in a plane parallel to the same surface. This difference is displayed in a striking manner by Iceland spar, which polarized carbonates of lime, the one being divided into two different parts by a wave of light passing through the spar is divided into two—the one rapid, corresponding to ice, the greater elasticity; and the other slow, corresponding to the lesser elasticity. Where the velocity is least, the refraction is greatest. Hence in Iceland spar, we have two ways moving with different velocities, yet having double refraction. This is also true of the number of molecules of crystalline ice, the one being the greater number of directions in which the ether will not be in all directions equally elastic and double refraction will failfully result."

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